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EXPERIMENTS SELECTED FOR MAGNETIC FIELD SATELLITE

The National Aeronautics and Space Administration has selected 32 proposals for investigations using the data to be obtained from its soon-to-be-launched Magnetic Field Satellite (Magsat).

Nineteen of the proposals were from U.S. principal investigators and 13 came from foreign scientists.

The project managed by the NASA Goddard Space Flight Center, Greenbelt, Md., is designed to measure the near Earth magnetic field on a global basis.

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Magsat is one of several elements of NASA's Resource Observation Program. One of the program goals is to use space techniques to assist in understanding the dynamic processes which formed the present geologic features of the Earth and how these processes relate to natural hazards and to the emplacement of non-renewable natural resources.

Magsat is to be orbited from the Air Force Western Test Range this October by a NASA Scout launch vehicle. The satellite will be placed in a Sun-synchronous orbit with an inclination of 97 degrees, perigee near 350 kilometers (217 miles) and apogee near 550 km (341 mi.). Sun-synchronous means that the plane of Magsat's orbit will always be perpendicular to the Earth-Sun line. In other words, the satellite will be in a near-polar orbit and always in the sunlight. A mission duration of about six months is anticipated.

The Magsat spacecraft will carry two types of magnetometers, a cesium vapor scalar magnetometer and a fluxgate vector magnetometer. To minimize errors caused by spacecraft magnetic fields, the magnetometers will be located at the end of an extendable boom, about 6 meters (20 feet) long.

The Magsat mission objectives are to:

- Obtain an accurate, up-to-date quantitative description of the Earth's main magnetic field.

- Provide data and a worldwide magnetic field model suitable for the U.S. Geological Survey to update and refine magnetic charts and maps.

- Compile global scalar and vector crustal magnetic anomaly maps. The spatial resolution goal for the anomaly map is 300 km (190 mi.).

- Interpret the crustal anomaly map, in conjunction with correlative data, in terms of geologic/geophysical models of the Earth's crust, thus providing information useful for assessment of natural resources and the determination of future exploration strategies.

Magsat data will provide field models and global and regional charts for the 1980's. The vector measurements will resolve ambiguities in field direction, particularly in applications such as field line tracing, background field removal in exploration geophysics and separation of induced and remanent magnetization in magnetic anomalies.

Analysis and interpretation of Magsat data will be the responsibility of a team of U.S. and foreign scientists whose proposals were selected through a peer group evaluation process.

Prior to the satellite era, magnetic data from many geographic regions, particularly oceanic and polar regions, were nonexistent or sparse. The NASA Polar Orbiting Geophysical Observatory satellites made global measurements of the scalar magnetic field from October 1965 through June 1971, and several geomagnetic field models based on satellite data have been published. Data from the satellites also resulted in the first global magnetic anomaly map, even though these multipurpose missions were not designed primarily for the study of near-Earth fields.

The Magsat mission, with its increased resolution and higher signal levels from the anomalous fields, is designed to overcome some of the shortcomings of the data from the earlier satellites for making anomaly maps.

The selected investigations and investigators are as follows:

GEOPHYSICS

Investigation of Antarctic Crust and Upper Mantle Using Magsat and Other Geophysical Data--C.R. Bentley, University of Wisconsin, Madison.

Application of Magsat to Lithospheric Modeling in South America Part I--W.J. Hinze, Purdue University, West Lafayette, Ind.

Application of Magsat to Lithospheric Modeling in South America: Part II--G.R. Keller, University of Texas, El Paso.

Magsat Anomaly Field Inversion and Interpretation for the U.S.--M.A. Mahew, Business and Technological Systems, Inc., Seabrook, Md.

Magsat for Geomagnetic Studies in the Indian Region--B.N. Bhargava, Indian Institute for Geomagnetism, Bombay, India.

The Reduction, Verification and Interpretation of Magsat Magnetic Data Over Canada--R.L. Coles, Energy, Mines and Resources, Ottawa, Canada.

Magsat Data, the Regional Magnetic Field, and the Crustal Structure of Australia and Antarctica--J.C. Dooley, Bureau of Mineral Resouces, Canberra, Australia.

Japanese National Team Study of Crustal Structure and the External Magnetic Field--N. Fukushima, Japanese Research Laboratory, Tokyo.

Crustal Structures Under the Active Volcanic Areas of Central and Eastern Mediterranean--P. Gasparini, Osservatorio Vesuviano, Naples, Italy.

Crustal Properties of Australia and Surrounding Regions Derived from Interpretation of Magsat Anomaly Field Data--B.D. Johnson, Macquarie University, Australia.

Data Reduction, Studies of Europe and Central Africa and the Secular Variation--J.L. le Mouel, Institut de Physique du Globe, Toulouse, France.

GEOLOGY

Use of Magsat Anomaly Data for Crustal Structure and Mineral Resources in the U.S. Midcontinent--R.S. Carmichael, University of Iowa, Iowa City.

The Minerology of Global Magnetic Anomalies--S.E. Haggerty, University of Massachusetts, Amherst.

An Investigation of Magsat and Complementary Data Emphasizing Precambrian Shields and Adjacent Areas of West Africa and South America--D.A. Hastings, Michigan Technological University, Houghton.

Compatibility Study of the Magsat Data and Aeromagnetic Data in the Eastern Piedmont of the U.S.--I.J. Won, North Carolina State University, Raleigh.

The Magnetic Anomaly of Bangui--M.R. Godivier, Office de la Recherche Scientifique et Technique Outre-Mer, Paris.

Identification of the Magnetic Signatures of Lithostratographic and Structural Elements in the Canadian Shield Using Magnetic Anomalies and Data from Individual Tracks from Magsat--D.H. Hall, University of Manitoba, Canada.

Structure, Composition, and Thermal State of the Crust in Brazil--I.I. Gill Pacca, Instituto Astronomico e Geofisico--USP, Sao Paulo, Brazil.

Analysis of the Magnetic Anomaly Maps from Magsat Over Portions of the Canadian and Other Shields--D.W. Strangeway, University of Toronto, Canada.

FIELD MODELING

Geomagnetic Field Modeling by Optimal Recursive Filtering--B.P. Gibbs, Business and Technological Systems, Inc.

Equivalent Source Modeling of the Main Field Using Magsat Data--M.A. Mahew, Business and Technological Systems, Inc.

Study of Enhanced Errors and of the Secular Variation Using Magsat Models and Those Derived in POGO Surveys--D.P. Stern, NASA/Goddard Space Flight Center, Greenbelt, Md.

Spherical Harmonic Representation of the Main Geomagnetic Field for World Charting and Investigation of Some Fundamental Problems of Physics and Geophysics--D.R. Barraclough, Institute of Geological Sciences, Edinburgh, United Kingdom.

MARINE STUDIES

Satellite Magnetic and Gravity Investigation of the Eastern Indian Ocean--R.F. Brammer, The Analytic Sciences Corp., Reading, Mass.

Investigations of Medium Wavelength Magnetic Anomalies in the Eastern Pacific Using Magsat Data--C.G.A. Harrison, University of Miami, Fla.

Analysis of Intermediate-Wavelength Magnetic Anomalies Over the Oceans in Magsat and Sea Surface Data-- J.L. La Brecque, Lamont-Doherty Geological Observatory, Palisades, N.Y.

MAGNETOSPHERE/IONSPHERE

Investigation of the Effects of External Current Systems on the Magsat Data Utilizing Grid Cell Modeling Techniques--D.M. Klumpar, University of Texas, Richardson.

Investigation of Magsat and Triad Magnetometer Data to Provide Corrective Information on High-Latitude External Fields--T.A. Potemra, Johns Hopkins University, Laurel, Md.

Improved Definition of Crustal Magnetic Anomalies in Magsat Data--R.D. Regan, Phoenix Corp., McLean, Va.

Studies of High Latitude Current Systems Using Magsat Vector Data--J.F. Burrows, National Research Council of Canada, Ottawa.

CORE/MANTLE STUDIES

Geomagnetic Field Forecasting and Fluid Dynamics of the Core--E.R. Benton, University of Colorado, Boulder.

Electromagnetic Deep-Probing of the Earth's Interior from Artificial Satellites: Constraints on the Regional Emplacements of Crustal Resources--J.F. Hermance, Brown University, Providence, R.I.

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